United Nations E/CN.17/2001/6/Add.4

Economic and Social Council

Distr.: General
9 January 2001

Original: English

Commission on Sustainable Development
Ninth session
16-27 April 2001

Multi-stake holder dialogue on sustainable energy and transport

Note by the Secretary-General

Addendum

Discussion paper contributed by local authorities*

Contents

	Page
Introduction	2
Topic 1. Achieving equitable access to cleaner energy	4
Topic 2. Choices for producing, distributing and consuming cleaner energy	9
Topic 3. Methods, including public private partnerships, to achieve cleaner, sustainable energy for transport	14
Topic 4. Sustainable transport planning: choices and models for human settlements, transportation, infrastructure and transportation modes	19

* Prepared by the International Council for Local Environment Initiatives; the views and opinions expressed do not necessarily represent those of the United Nations

01-21459 (E) 140201

Introduction

1. Air pollution, global climate change and inequitable access to fulfill energy needs are the most visible and pressing concerns resulting from the current fossil fuel based energy system. Other environmental and social stresses such as water pollution, residual pollution in soils and plant matter, loss of green spaces and habitat, and disproportionate burden on poor populations are also caused by the production and final use of fossil fuels for transport and stationary energy.

2. The impact of vehicles bears particular emphasis. Fossil fuel combustion vehicles are the largest source of urban air pollution, a significant and growing contributor to the emissions causing climate change, and a large indirect source of ecosystem stress resulting from the infrastructure required to support vehicle use, e.g.: roads, fueling stations, parking lots.

3. National governments, through national energy policies, operation of centralized or national electric utilities, tax policies and subsidies to certain energy sources, strongly influence the quantity and source of energy used within a country. National policies also strongly influence all aspects of transportation including infrastructure, vehicle manufacture and transportation modes. Through the promotion of particular energy and infrastructure policies and the financing of large centralized energy generation and transportation projects such as road expansion, international donor agencies and multilateral financial institutions also have a significant influence on a country's transportation and energy systems. To date, most of these policies have given preference to energy and transportation systems that are environmentally and socially unsustainable.

4. To achieve clean and sustainable energy and transportation, changes are necessary. How energy is generated and distributed, the sources of energy used to produce electricity and fuel

transportation, as well as changes in the demand for energy and the demand and mode choices for transportation must be put in place. These changes need to come from all levels of government and international agencies and with the cooperation and participation of the private sector. Local governments particularly have a vital role to play in transforming energy and transport to practices that are environmentally and socially sustainable. Although local governments are generally in the background of the debate, they, in fact, have significant influence on energy and transport demand.

5. ICLEI's effort to understand the relationship between urbanization, local government policy, energy use and climate change began in 1991 through the Urban CO_2 Reduction Project. This project analyzed 14 American, Canadian, and European cities to understand local government's role in affecting stationery and transport energy use. The research revealed a striking correlation between the level of energy use in a community with factors such as population density, type of infrastructure, land use patterns, presence of transit options and transit system design, and local building design.

6. Details in the planning, design and building of the European cities provided efficiencies in energy use that were absent in North American cities. Energy efficient cities balanced transit with automobile infrastructure, had land use policies which combined rather than separated housing jobs and services, and incorporated smaller scale energy distribution systems such as district heating and cooling systems. These factors, which are often wholly or partly controlled by local governments, have profound and long-lasting effects on the sources of and quantity of stationary energy and transport fuel used, which in turn affects the level of air pollution and greenhouse gas emissions.

7. The critical role local governments play in the energy and transportation management picture need to be acknowledged. Among the factors that make local governments a logical inclusion in the equation to achieve cleaner and more sustainable energy and transport are:

(i) Decentralization of powers and authority from national governments to lower levels of government is expanding rapidly worldwide.

(ii) Local governments own and operate buildings, vehicles, and facilities such as street

lighting, and water supply and treatment, which directly consume large quantities of fuel and electricity.

(iii) Local governments often control local land use policies, determining where buildings and development are located and the mix of uses that are allowed which in turn affect transportation and energy use.

(iv) Local governments make or exert influence on road, transportation and transit system decisions and investments.

(v) Local governments often have regulatory influence or responsibility for building codes, determining the energy efficiency of the local building stock.

(vi) Local governments manage and regulate vehicle parking, traffic flow and transit systems influencing choice of travel mode and length of trip -significant determiners of transportation energy use.

8. Local governments, national governments and international agencies utilizing the full range of their regulatory, statutory and financial powers are key to achieving sustainable energy and transportation practices. Research indicates that when cities plan and develop with energy efficiency in mind, per capita energy consumption for residential and transportation needs can be cut by several tens of percent from typical levels. Forward thinking national governments and monetary agencies will understand that initial build in or inclusion of technologies for clean energy, energy efficiency and low GHG emissions come at a much lower cost than the cost required to retrofit such systems and technologies later. The rate of development and the enormity of infrastructure investments in developing country cities lends an even stronger rationale for facilitating effective, local urban energy and transportation management at the onset.

Topic 1: Achieving Equitable Access to Cleaner Energy

9. Burning fossil fuels to produce energy is the major cause worldwide of air pollution, acid rain and global climate change. Populations that lack access to a formalized energy system are not dependent on large-scale fossil fuel energy generation. Nonetheless, their lack of access to the formal energy system to fulfill needs such as heating and cooking has other serious

environmental and social consequences. More than two billion people throughout the world do not have access to electricity and continue to use traditional fuels for basic energy needs. Dependence, for example, on wood fuel results in land clearing, serious land degradation and loss of animal and plant habitat. The dependence on coal bricks, paraffin or other forms of portable fuel burned in inefficient and dangerous stoves have serious health consequences and costs that are disproportionate to the users income and the quantity of energy that is produced. Poor urban households also spend a significant proportion of their limited cash incomes on energy.

10. Access to energy and energy reliability are major issues that affect all regions of the world, though it currently impacts developing countries more severely than countries with high GNP and high per capita energy use. The lack of energy stability hurts economic growth and productivity and stymies efforts to alleviate poverty and environmental degradation.

11. Achieving equitable access to cleaner energy can be facilitated through: (i) leveling the economic playing field between fossil fuels and cleaner or renewable energy sources and between centralized versus decentralized energy generation, (ii) facilitating local level and decentralized energy generation, (iii) employing demand side measures to extend existing energy resources, and (iv) utilizing public investment to support clean energy infrastructure.

12. National subsidies on fossil fuel extraction and production inhibit economic viability of renewable energy sources. Rather than create conditions to encourage a transition to greater energy efficiency and lower energy use, governments tend to intensify problems by subsidizing energy production and consumption. Reducing permanent subsidies would improve market competitiveness for new technologies while yielding the added benefits of improving market efficiency and of considerably decreasing the burden on public spending. Renewable energy sources are thwarted by national and local taxes, subsidies and other policies that subsidize fossil fuel based energy and inhibit development of new renewable technologies and applications.

13. Research and development funds from national governments, and international monetary and donor agencies need to be directed to achieve the production of state of the art clean technologies

and renewable energy generation. Many promising renewable energy technologies for meeting sustainable development objectives require relatively modest research and development investments. The World Energy Council has estimated that the research and development expenditures needed world-wide over the next 20 years to advance a range of solar energy technologies is approximately US$8 billion. After the research phase, the high costs of the development process can be reduced with smaller scale renewable energy technologies.

14. Renewable energy sources can also be used to satisfy many of the energy service needs of growing urban populations. There are large numbers of people living in rural or remote areas where grid extension remains prohibitive based on infrastructure costs. Decentralised, renewable energy applications offer alternatives for the provision of affordable energy services while supporting local development and improved quality of life. Local government is an appropriate level of government to promote and facilitate the development of decentralised, renewable energy generation.

15. Renewable energy applications are available for space and water heating, electricity generation, and transportation. In Israel, for example, solar collectors are currently used to supply hot water for over 75% of Israeli homes. Generally, these energy sources neither pollute nor threaten public health. Renewable sources of energy are now reaching commercial viability due to technology improvements and decreasing prices. Solar, wind, geothermal, and commercial biomass options offer practical and attractive alternatives to conventional energy sources.

Case 1: COMPREHENSIVE SOLAR ENERGY INITIATIVE, Saarbrücken, Germany

- The City of Saarbrücken has a population of 190,000 and is located in southwestern Germany. Over the past 10 years Saarbrücken has worked to demonstrate that solar can play an important role to satisfy energy needs and reduce greenhouse gas emissions. In 1986, in a collaborative effort with the Stadtwerke Saarbrücken (the municipally owned utility) and the state of the Saarland, Saarbrücken set out to develop what has become Europe's leading solar demonstration initiative at the municipal level. A number of solar programs were begun including a solar rooftop program with the target of installing 1,000 KW of PV capacity on

residential rooftops. Saarbrücken has paved the way for solar energy to be considered as an energy source for municipalities located in northern latitudes.

Case 2: SOLAR WATER HEATING, Midrand, South Africa

- In 1999, Midrand joined Sustainable Energy, Environment and Development (SEED), a co-operation program that focuses on sustainable energy and environmental issues related to low-cost urban housing and integrated rural development. A pilot project to promote the use of solar water heaters in a low-income residential area, called Ivory Park, was undertaken in 1999.

SEED profiled energy use for residential water heating potential amongst low-income households and analyzed consumer responses to simple mobile solar water heating devices. The study identified that low-income households welcomed the energy savings associated with solar water heating devices. Midrand EcoCity is now in the process of planning the implementation of solar water heating systems in Ivory Park. The project's objective is to reduce CO2 emissions as well as the remove barriers to increase purchase and usage of solar water heaters. The plan is to equip 9000 homes in Ivory Park with solar water heaters over the next 20 years.

16. Demand side investment is also a strategy that can be employed to extend existing power generation and improve reliability in power stressed areas. It can also provide a certain measure of energy security that is not dependent on fluctuating fuel or power supply. There is growing recognition in industrialized countries that some of the greatest and most cost-effective opportunities for sustainable energy development involve improving end-use efficiency by providing the same energy service with less energy inputs or, to achieve more energy services for the same energy input.

17. End-use energy efficiency improvement reduces the environmental downside of energy production. It is also an inexpensive strategy to increase access to affordable energy services and, is generally far more affordable than new supply. Large potential exists for energy savings through energy efficiency improvements in the buildings, transport and industrial sectors. Moreover, research and development of energy technology has not approached its limits in the

provision of continuing improvements to energy efficiency.

18. Local governments are uniquely positioned to promote and implement measures that reduce energy demand and improve energy efficiency. Local governments can use regulatory powers, such as those that set land use development and building standards, to facilitate decentralized energy production and efficient energy technologies. These measures have extended the local energy resources and in some cases provided access to energy services to areas without grid connection. The Better Buildings Partnership, a program between the municipality of Toronto, Canada and local private utilities, promotes and implements energy efficiency retrofits of industrial, commercial, institutional and multi-residential buildings. The program is marketed by the City and funded by the utilities through reinvested avoided costs achieved from the reduced power demand that resulted by improving the energy efficiency of the building stock.

19. Throughout the lower income regions of the world, public utilities have become unable to provide quality services on a continuing basis or to respond adequately to rapidly increasing demand. If public investments in energy decreases further and alternatives are not considered, the quality of energy services will decline further. Just as public investment was used to establish the electricity grid and distribution system, public investment should now be used to selectively encourage cleaner and renewable energy. Public investment can and should now be used to support demand side investments and decentralized energy production such as solar rooftops, biomass production, district energy systems and combined heat and power systems that can extend clean energy to people practically and at lower cost than many centralized systems.

20. Recommendations on Topic 1:

(i) *Level the Economic Playing Field For Cleaner And Renewable Energy Sources.* Reform of policies, such as the removal of subsidies for fossil fuels and elimination of levies that inhibit new clean technologies, are needed at all levels of government and multi-lateral agencies

(ii) *Encourage Investment In And Implementation Of Clean, Decentralized Energy Generation.* Local governments should be encouraged to promote and establish clean,

decentralized energy generation such as combined heat and power systems, rooftop solar, biogeneration, etc.

(iii) *Enable Implementation of Local Demand Side Measures.* Funds and policy support should be directed to local governments to implement measures that reduce energy demand in the residential, commercial and industrial sectors.

(iv) *Utilize Public Investment to Achieve Accessible and Clean Energy Infrastructure.* Public investment at all levels of government, including monetary and donor agency investment, should be directed to reduce energy demand and develop decentralised renewable energy generation.

Topic 2: Choices for Producing, Distributing and Consuming Cleaner Energy

21. It is technologically possible, and quite economically feasible, to provide heat, power or light services utilizing less energy. It is also feasible to generate electricity, whether from fossil fuels or from renewable sources, with technologies and methods that result in far less emissions and other detrimental environmental consequences. Effective policies that will result in the production, distribution and consumption of cleaner energy are those that reduce energy demand and promote both centralized and decentralized clean energy generation.

22. Despite the gains made by the industrial economies in energy efficiency over the past 20 years, per capita energy consumption is rising in every industrial country. The continuing sprawl of cities, increased demand for office equipment and household electrical appliances plays a significant role in this trend.

23. Apart from reducing the ecological risks caused by global warming, energy efficiency and demand side reduction measures create a host of environmental and public health benefits. The reduction of fossil fuel use improves local air quality by reducing emissions of nitrogen oxides, carbon monoxide, various hydrocarbons, and metals such as mercury and cadmium. These noxious gases negatively effect children and elderly people, as they are especially vulnerable to lung diseases caused or aggravated by these substances.

24. Demand side measures are key to energy and environmental sustainability. Conservation, efficiency or other demand side measures that allow a particular task to be performed with less fuel or electricity are ultimately cleaner energy measures. Demand side measures can be facilitated through national level policy such as minimum requirements on utilities and power providers for supplying specified percentages of power via demand side measures, energy efficiency standards for motors and appliances and building codes which specify energy efficiency ratings for all new construction. National government and multi-lateral financial agency investments should be geared at least equally toward reducing energy demand and generating new power supply.

25. Local governments have an especially important role to play in the demand side equation. Local government purchasing policies can give preference to energy efficient products, local building and development codes can incorporate energy efficiency standards, and public private partnerships can be established to improve energy efficiency in the commercial and residential sectors.

Case 3: ENERGY EFFICIENCY STREETLIGHT CONVERSION, Naga City, Philippines

- Naga City plans to convert existing mercury vapor lamps in 10,000 streetlights with energy-efficient sodium vapor lamps to reduce 20% of the city's electricity use.

Case 4: REDUCING ENERGY DEMAND, Portland, Oregon, USA

- The City of Portland has implemented an array of demand side measures. Energy efficiency retrofits of municipal buildings and efficient design of new municipal buildings and facilities has cut 9.5 million kWh of electricity and saved the City $1.3 million in energy expenditures. Portland's Home and Multi-Unit Weatherization Program provides energy efficiency services to homes and apartment dwellers. To date over 20,000 households have received energy efficiency improvements with $2.5 million saved in reduced energy expenses over the past 10 years.

26. Air pollution emission trading and credit schemes are now in place in a number of countries. Emission reduction credits reward those who take action to reduce their pollutant emissions thus

encouraging pollution reduction actions. Credits for emission reductions provide an incentive to find the most cost-effective way to reduce emissions, since once an emission reduction credit is created, it can be sold on the open market.

27. Emission credits should be extended to demand side activities. Legislation to award credit for emission reductions has the potential to generate important benefits, but could also result in serious problems if credits are obtained for actions that do not produce "real" emission reductions. Emissions reduction credit schemes should always adhere to practices that produce real environmental and economic benefits. It is important that appropriate protocols are put in place for both industrialized and developing countries because of the different nature of their economies and energy systems.

28. Compressed natural gas and renewable energy sources such as wind and solar are generally a cleaner energy source than coal and other fossil fuels. Cleaner energy production, for fuel types such as coal, is technologically available, such as coal conversion technologies that turn coal into a gas or liquid that can be cleaned and used as fuel. Combined cycle coal systems are some of the most efficient as they use the residual heat from the coal burning to also generate electricity. But clean energy production is thwarted by subsidies that support fossil fuel mining and production and by the lack of clear regulations that would set standards for clean energy production.

29. To facilitate cleaner energy production for all fuel types, whether fossil, renewable or other, national standards need to be set that regulate energy generation and place limits on the pollution and emissions generated from power plants regardless of fuel type.

Case 5: INTEGRATED GASIFICATION COMBINED CYCLE PLANT, Indiana, USA

- The Wabash River Generating Station is one of the cleanest coal-fired facilities in the world. Originally a 1950s steam turbine, the steam turbine was repowered and a new syngas fired combustion turbine was installed. The plant utilizes locally mined high-sulfur coal. The syngas is generated from gasification of a coal/water slurry. The syngas flows to a heat recovery unit producing high pressure steam that is then used to drive the steam turbine. Particulates in the gas are removed and recycled where the remaining carbon is again

converted to syngas that is then burned in a gas turbine to produce electricity. All exhaust heat is recovered and used to produce steam for the steam turbine to produce more electricity. Thermal efficiency of the plant is quite high, the greater the thermal efficiency the less coal is needed to generate a given amount of electricity. The SO2 emission rate from the plant is less than one-tenth the limit set for 2000 by the acid rain provisions of the US Clean Air Act. Particulate emissions are also less than approved EPA standards. The success of the IGCC technology used at Wabash is an ideal model for conversion of older coal plants and for standards for new coal powered generation.

30. In many cases, local governments have a better track record than national governments in the development and promotion of clean energy production. Local governments have effectively implemented district energy systems, systems using combined heat and power, solar generation using commercial and residential rooftops, and recovery of landfill or sewage methane to generate electricity.

Case 6: SEWAGE AND WASTE METHANE FOR ELECTRICITY, Brisbane, Australia

- At the City of Brisbane's Luggage Point sewage treatment plant, methane is being converted into electricity, offsetting approximately 5% of municipal electricity consumption. A landfill gas project is using recovered gas to heat a municipal swimming pool. In 1999, these initiatives saved the city more than $1 million in electricity costs.

Case 7: USE OF COMBINED HEAT AND POWER, Copenhagen, Denmark

- Copenhagen expanded its district heating system to cover 95% of the city's heating needs. The city used its regulatory authority to mandate compulsory connection to the system and prohibited installation of electric heating in new buildings. Copenhagen is also converting most of the City's coal fired boilers to natural gas. The natural gas generating stations are less expensive than coal-burning counterparts. The aim is to triple the use of natural gas for power generation, resulting in a 5% reduction in CO_2 emissions (260,000 tonnes) and cleaner air.

31. Consumers should also be guaranteed a clean energy choice. This can be achieved by

electricity market restructuring or new standards on electricity production that provide customers the ability to select either a clean energy source or their own power provider. Information must be provided to all customers on contract terms, cost, generation sources, and emissions characteristics of power being offered. Local governments can prepare the community by informing them about new opportunities in purchasing power from renewable energy sources, such as solar, wind, biomass, or hydroelectric.

Case 8: RENEWABLE ENERGY POWER AGREEMENT, Portland, Oregon, USA

- The City of Portland developed a contract with an electric utility to guarantee that 5% of electricity available to utility customers was generated from new wind power sources, resulting in 4million kWh switched to wind power.

32. Recommendations on Topic 2:

(i) *Prioritize Demand Side Investments*. National government and international policy and monetary agencies prioritizing investment in demand side programs will extend capability of power supply and energy resources.

(ii) *Encourage Local Government Implementation of Demand Side Measures*. Local governments should be supported to implement policies that reduce energy use such as energy efficient building codes, purchasing policies and district power schemes that utilize co-generation or combined heat and power systems.

(iii) *Credit Energy Efficiency in Trading Schemes*. Emission trading schemes should give credit to demand side measures and not only reward measures that improve power generation.

(iv) *Set National Standards for Clean Energy Production*. Ceilings on standard air pollutant and carbon emissions promote clean electricity generation and provide consumers a clean energy product.

(v) *Fund Research and Development of Clean Technology and Renewable Energy*. National governments, and international monetary and donor agencies need to direct funds to produce state of the art clean technologies and renewable energy generation.

(vi) *Utilize Small Scale and Decentralized Energy Production.* Small scale energy production from renewable sources such as solar, methane can facilitate production and distribution of clean energy

Topic 3: Methods, Including Public Private Partnerships, to Achieve Cleaner, Sustainable Energy for Transport

33. The combustion of fossil fuels to provide energy for transport vehicles produces carbon dioxide, methane, nitrous oxide, hydrocarbons, and carbon monoxide. These polluting emissions are generated throughout the entire vehicle and fuel cycle from the assembly and manufacturing through to extraction, distribution, and end use. Fossil fuel powered vehicles are now the primary cause of rising emissions of greenhouse gases and air pollutants in urbanized areas.

34. There are many different approaches advocated to reduce polluting emissions from vehicles. While "end of pipe" technologies such as catalytic converters help reduce the emissions that contribute to smog formation their impact on CO_2 emissions, the primary greenhouse gas, is nil. The optimal means to reduce all categories of emissions is to decrease the consumption of petroleum-based fuels. This can be achieved through improved vehicle technologies, alternate fuels or reducing the use of motorized vehicles through such measures as car sharing, promoting pedestrian and bicycle travel and, as discussed in the next topic, reduction of travel demand.

Case 9. CAR SHARING, Bremen, Germany, various cities in Europe

- Organised car sharing is a network of users with vehicles designated for shared use. In areas with good transit and land use design, a private vehicle is not needed for daily travel. The purpose of car sharing is to provide the flexibility of a vehicle for those times when a vehicle may be necessary without the need and expense of sole ownership. Car sharing reduces the energy consumption, noise and air pollution of individual mobility. Car sharing organizations have developed mainly in Switzerland, Germany, Austria and the Netherlands. The organizations have a pool of cars at the disposal of their members. The cars are located at reserved parking spaces and can be booked by the members 24 hours a day. In Bremen, the car sharing organization was a joint project of the City and a private company, StadtAuto.

Bremen has 34 locations distributed throughout housing areas meaning the user has only a short walk or bicycle ride to access the car.

35. One of the most effective means to decrease consumption of petroleum-based fuels is through improving vehicle fuel efficiency. Practical, technically feasible designs for high efficiency vehicles exist and it is well within the capability of automakers to produce them. Such a paradigm shift will need action by all levels of government and the private sector to motivate manufacturer changes.

36. Traditional vehicles, such as bicycles and three wheelers or motorized rickshaws are a practical and viable alternative to larger motor vehicles. Bicycles are often an appropriate choice for urban travel. Their use should be promoted by national and local government policies to ensure that bicycles are given an equal playing field economically and equal access to infrastructure to support safe use.

37. In many Asian cities the two-stroke auto rickshaw is a common mode of transportation. The two-stroke engine in most auto rickshaws is a notorious producer of air pollution emissions. however, auto rickshaws can be designed with fuel-efficient, lower polluting engines. Rather than eliminating this traditional vehicle, better technologies for auto rickshaws should be encouraged. A project in Bangladesh aims to replace all inefficient and highly polluting two-stroke engine auto-rickshaws with high efficiency four-stroke engine vehicles. Each efficient vehicle will reduce gasoline consumption. The more efficient auto-rickshaw engines will achieve higher local air quality due to reduced emissions of lead and particulate matter improving the health of rickshaw drivers, passengers, and local inhabitants.

38. Kathmandu, Nepal has begun a program to promote electric powered auto rickshaws, eliminating tailpipe pollution. Such programs are optimal when the electricity can be generated from a renewable source. To charge electric vehicles, the City of Santa Monica, USA has installed solar photovoltaic (PV) panels atop of the city-owned parking lot. These panels can charge seven electric vehicles at a time. The electric car drivers simply park and plug their vehicles into the 110 volt or 220 volt outlets provided.

39. Alternative fuels, especially those formulated from renewable sources, such as ethanol from wood residue, methanol from recovered methane or electricity generated from renewable resources, also hold promise. Many governments and industries are currently implementing programs for alternative fuels. Most have focused on fuels such as natural gas and propane, both fossil fuels but with lower polluting emissions than gasoline or diesel. However, the full range of environmental and economic impacts over the full lifecycle of a fossil fuel generated alternative fuel needs to be considered. Research into the full lifecycles of various fuels rates few alternative fuels highly. Optimal is the use of the best alternative fuel in highly efficient vehicle technologies, such as hybrid and fuel cell vehicles, designed to produce ultra-low or no emissions.

Case 10: CONVERSION OF FLEET VEHICLES TO LPG, Queretaro, Mexico

- Queretaro switched 73 police vehicles from gasoline to LPG (liquid propane gas). Doing so reduced 207 tonnes of CO_2/year and significant quantity of air pollution emissions and saved the city approximately US $143,000 annually.

40. Improving the engine operation and efficiency of transport vehicles would considerably reduce environmental impacts. Motor vehicle emissions can be controlled most effectively by designing the vehicle to have low emissions. Because these controls increase the cost and complexity of design, vehicle manufacturers require incentives to produce them. These incentives may involve mandatory standards, financial inducement, or both. Since compliance with stricter emission standards usually involves higher initial costs, the optimal level of emission standards can vary among countries. Therefore, to even the playing field a strong case can be made for adopting a single set of international vehicle emission standards and test procedures for both industrialized and developing countries.

41. The U.S. Environmental Protection Agency (EPA) is announcing stricter tailpipe emissions standards for all passenger vehicles, including sport utility vehicles (SUVs), minivans, vans and pick-up trucks. This regulation is the first time the EPA is considering vehicles and fuels as one system. The EPA is also announcing higher standards to lower sulfur content in gasoline. These

new standards will require passenger vehicles to be 77 to 95 percent cleaner than those presently on the road and will also reduce the sulfur content of gasoline by up to 90 percent. As the U.S. is one of the largest vehicle markets, manufacturers worldwide will be producing vehicles to meet these new standards. There is only politics, opposition from vehicle manufacturers and resistance to uniformity that stand in the way of such standards being applied universally.

42. Most vehicles are driven in urban areas for short distances in stop and go traffic at speeds of between 20 to 40 miles per hour. Yet, manufacturers have designed most vehicles to operate maximally at driving conditions of between 55 to 65 miles per hour. An additional standard that should be considered is to design vehicles to operate most efficiently while idling and operating in urban driving conditions rather than at highway speeds.

43. Partnerships can be established between government and private sector to speed transition to better vehicle and transportation infrastructure technology. A unique collaborative of auto manufacturers, oil companies, a fuel cell company, and the State of California is "The California Fuel Cell Partnership". This Partnership aims to advance new automobile technology incorporating environmental solutions in vehicular design and fuel sourcing. This is the first time automobile companies and fuel suppliers will merge to demonstrate fuel cell vehicles under realistic driving conditions. In addition to testing the fuel cell vehicles, the Partnership will also identify fuel infrastructure issues and prepare the California market for this new technology.

44. Public leadership can help implement best practices regarding fuel and vehicle use. Governments can use their purchasing powers to buy fuel-efficient vehicles and new state of the art clean vehicle technologies, sending the market signals that demonstrate demand for these better vehicle products. Governments can also show leadership to achieve cleaner transport by downsize the number of vehicles in their fleet, minimizing vehicle use and employing non-combustion vehicles such as bicycles.

Case 11: COPS ON BICYCLES. Puerto Princessa (other cities), Philippines

- Puerto Princessa, Naga City, and Tagbilaran, Philippines have begun switching selected police officers to bicycles in order to maintain peace and order. Cops-on-Bikes has proven

extremely effective in enforcing law and order in the community, enhancing police visibility and reducing city costs. The cities have found bicycles to be an affordable and non-polluting alternative to motor vehicles. By the end of year 2000, 30 percent of the total police force in Naga City will be provided with bicycles.

45. Recommendations on Topic 3:

(i) *Set National Standards for Production of Clean, No to Low Emission Vehicles.* National standards should ensure the production of the best available efficient and clean vehicle technology. Standards should provide for vehicles that are at their optimum while idling and traveling at low, urban street congested speeds.

(ii) *Use Public Leadership to Promote Cleaner Transport.* Public leadership can stimulate widespread private action. All levels of government should implement policies to promote fuel efficient and advanced technology vehicles, downsize fleet sizes, minimize vehicle use and utilize non-combustion vehicles such as bicycles.

(iii) *Use Government Purchasing Power to Send Market Signals for Clean Vehicles.* Government purchasing policies can give preference to clean and efficient vehicles. Governments can also partner with business to encourage the production of clean vehicle technologies.

(iv) *Direct Research and Development Funds to Advanced Clean Vehicle Technologies.* Donor agencies, national government and international financial agencies should direct research and development funding to achieve advanced clean vehicle technology.

(v) *Eliminate Economic Disincentives to Clean Transport.* Taxes, fees and customs duties on better vehicle technologies, including bicycles, need to be lowered or eliminated to help achieve equitable access to cleaner transport.

(vi) *Encourage Production of Cleaner, Economic Fuels.* Multi-national oil companies controlled from the North should cooperate with developing country governments to provide cleaner, economically viable fuels.

Topic 4: Sustainable Transport Planning: Choices and Models for Human Settlements, Transportation Infrastructure and Transportation Modes

46. In studying the differences between European and North American cities, ICLEI's Urban CO_2 Reduction Project found that higher urban population densities facilitated urban settlement and development patterns, transit and transportation systems, and housing and building characteristics that resulted in lower per capita energy use. Effectively designed and managed urban areas also enhanced access to needs and services rather than reliance on transport. Yet, population density was not by itself the determinant of energy use levels. The more efficient cities were highly dependent upon transportation systems well integrated within the urban layout.

47. Excessive use of automobiles causes problems for cities throughout the world. Car-based transportation has led to low-density urban sprawl and the decline of the city center. Past and present land-use policies in most urban areas have lead to unacceptable levels of traffic congestion, longer travel times, non-sustainable levels of fossil fuel consumption, air pollution, deterioration of livability in the urban environment, and increased rates of transportation-related accidents.

48. Integrated transport systems consist of a variety of modes of transport within the city, applying each where it is most efficient. In many cities throughout the world the failure to effectively integrate transportation and land-use policies has created non-sustainable dependencies upon automobile use and weak public transit systems.

49. The key to solving these common urban problems is to re-integrate transportation with land-use planning so that the land-use pattern can support more sustainable and environmentally acceptable transport modes, such as public transit, bicycling, and walking. The effectiveness and financial viability of public transit systems, for example, is a function of the number of transit users residing along public transit corridors.

Case 12: LAND USE TO REDUCE TRANSPORTATION DEMAND, Portland, USA

- The City of Portland changed its land use policies to increase residential density along

existing transit corridors. This change has resulted in the addition of 2,500 new housing units per year in the downtown area and a reduction in the length and number of vehicle trips to the downtown. It also eliminated 2.5 million vehicle miles traveled (VMT), saved 137,958 gallons of gas and saved $179,346 in reduced fuel expenses.

50. National governments need to decentralize land use powers to allow local governments to use these powers effectively and appropriately for unique local conditions. Local governments that use land-use planning, zoning regulations, permit conditions, municipal ordinances, and bylaws can contribute to well-designed urban areas. By mixing residential density with accessibility and proximity to commercial and retail services and providing transit, along with pedestrian and bicycle friendly infrastructures, communities can have far lower per capita vehicle trips, transport energy use and resulting global warming and air pollution emissions.

Case 13: INTEGRATING LAND-USE AND TRANSPORT, Curitiba, Brazil

- Curitiba, Brazil used zoning and public housing policies to direct growth to designated corridors. These corridors were then provided with public transit services. The program built upon existing, organic land-use patterns to establish a well-defined road hierarchy, which designated specific functions for each road in the city, taking into consideration the optimal transport mode for each specific road. Once optimal transport modes were determined, the physical structures of the roads were altered to best support these transit modes.

The policy changes resulted in public transit that supports 70 percent of the average daily commuter trips on a citywide basis. The high rider use and the efficiency of the system permits operation of public transit services at a profitable level, permitting the city government to operate the system in partnership with private transport carriers. The system operates without any direct subsidy from city coffers.

51. The automobile-based transportation system prevalent today allows individuals and businesses to be extremely mobile. However, this excessive vehicle use comes at great costs to society, communities, the environment, and humans. Local governments bear a large economic burden from this dependence on the automobile. Studies have found that motor vehicle revenues cover only less than half of the cost incurred by local governments to provide the infrastructure,

maintenance and services needed by automobiles. Local governments usually subsidize the shortfall. Reducing the local automobile subsidy can save general funds that could be used for alternative transportation.

52. Many transportation systems in place have made it very expensive for individuals to purchase and insure a motor vehicle, while keeping marginal motor vehicle user costs very low. Tax systems and zoning and design standards continue to favor motor vehicle ownership and use along with low-density automobile-dependent development patterns while discriminating against dense, mixed-use, transit-oriented development. Together, these forces have promoted highly automobile-dependent areas. To make matters worse subsidies and government policies support the oil, auto, and road building industries as well as low-density land use decisions.

53. Subsidies sway consumer choice to more costly and less efficient patterns of behavior and suppress the development of many alternatives. It also creates major inequities with respect to access to mobility, as many people cannot afford the costs to own and maintain a car. Often these taxpayers are excluded from the principle form of transportation, automobiles and must rely on public transit systems that may be inadequate. Consequently, many people are unable to access employment, recreational and other opportunities that require motor vehicle transportation. Moreover, there is inequality in access between those with full access to private motor vehicles and those without, such as children and the disabled.

54. The total costs of transportation system development and operations have been hidden as external costs that affect everybody, not just the consumers or producers of mobility. The principal external costs associated with transport are accidents, air pollution and noise. Economic instruments are effective tools that local governments can use to incorporate the full costs of transportation decision into a price that the driver incurs. This is an example of the *User Pay* principle: those who use a service or resource should pay the full economic cost of that use. The principle can also assist local governments to generate finances to support transportation projects such as transit systems and bicycle and pedestrian options to reduce automobile dependency. Federal and local subsidies should be provided to those systems (walking, bicycling, public transit, passenger and freight railroads and ferries) and equipment that go further toward

achieving accessibility, convenience, efficiency, cleanliness and equity goals.

Case 14: PARKING PRICING TO ENCOURAGE TRANSIT USE, Oxford, England

- Many local governments have reduced parking space requirements and imposed high parking fees to provide disincentives for automobile use. Oxford, England has developed a comprehensive plan to reduce traffic in the downtown area, which relies on parking fees combined with improved public transit service.

In response to increasing traffic congestion on the city's radial routes and in its downtown core, Oxford adopted a transport policy that emphasizes achieving a "balanced provision for cars, public transit, cycling and walking". The city first established a park-and-ride system, with free parking at the edge of the built-up area combined with fast, frequent, and affordable bus service to the urban center. The city then implemented a pricing policy on downtown public parking to discourage cars and provide an incentive to use the buses. Designated bus lanes, other traffic management measures, and a ring of residence-only parking zones further enhanced the attractiveness of the outlying parking lots with their accompanying bus service.

Case 15: LIMITING AUTOMOBILE USE, Republic of Singapore

- The Republic of Singapore, an island city-state, has a transportation policy with the goal of safe and efficient movement of people and goods rather than vehicles. Singapore has promoted efficient land use planning to minimize the need for travel, constructed a modest network of roads and highways and an impressive public transit system, and introduced other measures to limit the ownership and use of automobiles.

With a significant investment in public transportation, Singapore has built one of the cleanest and most efficient public transit systems in the world. The backbone of the system is the bus, and numerous park-and-ride lots encourage people to take express buses from the suburbs into the city center.

To both discourage auto use and help fund transit, Singapore initiated an area-licensing scheme requiring drivers who want to enter a Restricted Zone during peak traffic periods to purchase and display a supplementary license in their car window. The area licensing has controlled traffic congestion, demonstrated that fees and vehicle quotas limit growth in

vehicle use, and provides revenue to support a comprehensive and integrated public transit system.

55. Recommendations on Topic 4:

(i) *Prioritize Access Versus Mobility*. Transportation and land use investments and policies need to ensure access to goods services and jobs rather than mobility of vehicles.

(ii) *Equitable Transportation Investment*. Transportation investments by national and local governments and monetary agencies needs to be equitable toward transit, pedestrian, bicycle and other modes.

(iii) *Implement Land-Use Policies That Improve Quality Of Life*. Local governments need to implement land-use policies that promote land uses that reduce travel demand and place jobs, shopping facilities and community services close to residences.

(iv) *Decentralization Of Transportation Infrastructure*. National governments should move to decentralization of transportation infrastructure decisions so that local governments have more say over local use of transportation funds.

(v) *Equalize Private Vehicle Subsidies*. Market measures should be in place so that vehicle users are paying in more equal proportion to transit users and users of other modes.

(vi) *True Costs Need To Be Externalized*. True costs of vehicle use such as fuels, roads, pollution, accidents, etc. need to be externalized to create economic parity for other transport modes.